

Citation for published version:

Roehrich, J & Lewis, M 2014, 'Procuring complex performance: implications for exchange governance complexity', *International Journal of Operations & Production Management*, vol. 34, no. 2, pp. 221-241.
<https://doi.org/10.1108/IJOPM-01-2011-0024>

DOI:

[10.1108/IJOPM-01-2011-0024](https://doi.org/10.1108/IJOPM-01-2011-0024)

Publication date:

2014

Document Version

Peer reviewed version

[Link to publication](#)

The final publication is available at Emerald via <https://dx.doi.org/10.1108/IJOPM-01-2011-0024>

University of Bath

Alternative formats

If you require this document in an alternative format, please contact:
openaccess@bath.ac.uk

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

**PROCURING COMPLEX PERFORMANCE: IMPLICATIONS FOR EXCHANGE
GOVERNANCE COMPLEXITY**

Jens K. Roehrich^{a,} and Michael A. Lewis^a*

Forthcoming in the International Journal of Operations and Production Management

Special issue on ‘Procuring and Managing Complex Performance’,

Editors: Dr Mickey Howard and Dr Nigel Caldwell

^a School of Management, University of Bath, Claverton Down, Bath BA2 7AY, UK

**Author for correspondence.*

Jens Roehrich: Tel.: +44 (0) 1225 385 060; e-mail: j.roehrich@bath.ac.uk

Michael Lewis: Tel.: +44 (0) 1225 386 536; e-mail: M.A.Lewis@bath.ac.uk

Abstract

Purpose – While previous studies explored the argument that allies the notion of complexity to the complex product-service offerings being procured, this paper explores whether there is a corollary with exchange governance complexity. More specifically, the paper analyzes the relationship between systemic complexity and complexity of contractual and relational exchange governance in procuring complex performance (PCP) arrangements.

Design/methodology/approach - A multiple, longitudinal case study method is used to examine the relationship between systemic complexity and exchange governance complexity. The study deploys rich data sets by combining government and company reports with 43 semi-structured interviews.

Findings - Preliminary conclusions suggest that as a response to increasing systemic complexity, organizations respond with increasing contractual governance complexity. However, better performing PCP arrangements illustrate that the use of simplified contractual governance in form of working agreements in combination with relational governance such as inter-personal relationships may be more effective to counteract complexity.

Practical implications – The paper questions whether organizations should respond with increasing exchange governance complexity to counteract systemic complexity. Managers must consider the manageability and enforceability of complex contracts in combination with the formation of inter-personal relationships and simplified working agreements.

Originality/value – This study adds to the limited empirical understanding on the nature of long-term public-private interactions in procuring complex performance. It also contributes through a rare focus on the relationship between systemic complexity and exchange governance complexity in PCP arrangements.

Keywords - *Procuring complex performance, complexity, supply relationships, contracts, trust, longitudinal case study*

Paper category - Research paper

1. Introduction

Insights regarding the procurement of complex performance (PCP) have only just begun to emerge (Caldwell and Howard, 2010, Lewis and Roehrich, 2009). To date the majority of studies have focused on arguments about the inter-organizational governance 'ingredients' associated with coordinating the combined effects of product-service bundles necessitating high levels of provider knowledge and/or customer interaction and “bespoke or highly customized” infrastructure (Brady et al., 2005). In the PCP sub-field, complexity has typically been defined by taking into consideration a number of factors including the extent to which infrastructural components of the whole system are ‘bespoke or highly customized’, the number of project stakeholders and the length of planning/contracting negotiation and construction phases (Lewis and Roehrich (2009). These initial studies are limited in two important dimensions. First, they adopt a relatively narrow conceptualization of complexity¹; where the size of a system and its number of component parts is the principal correlate with complexity. However, with reference to the broader organizational complexity literature (e.g. Anderson, 1999; McKelvey, 1999; Levinthal and Warglien, 1999; Cunha and Rego, 2010; Geraldi et al., 2011), it is the *dynamic interactions* between these components that give rise to complexity – an emergent property that cannot be deduced from the properties of the components alone. Second, few studies have extended the complexity lens to also incorporate the governance 'regulator'. Following Ashby's (1956) 'law of requisite variety' for example, a system is only stable if the number of states of its control mechanism is greater than or equal to the number of states in the system being controlled. In other words this suggests that, when confronted with a complex situation (such as a PCP arrangement) there are two choices – increase the variety in the regulator (i.e. 'more' contractual and relational governance with more complete and hence larger contracts, requiring more lawyers, more contract managers, more KPIs, more meetings, etc.) or reduce the variety in the system being regulated.

It is these under-developed areas that shape the main focus and contribution of this paper. In addition to additive conceptual insights, the research analyzed rich (e.g. addressing both buyer and supplier perspectives) and longitudinal (i.e. investigating design, construction and operations phases) data from two case studies to help address two overall research questions: do successful PCP arrangements require complex exchange (i.e. contractual and relational) governance?; and what is the impact of exchange governance complexity on overall supply

¹ The authors thank one of the anonymous reviewers for helping us to clarify this crucial insight.

relationship performance over extended periods of time? Given the empirical focus of the work, the paper also contributes to an emerging literature on the nature of public-private interactions over extended time-periods (Mahoney et al., 2009). The findings illustrate that contemporary forms of contracting bring together explicit and legally enforceable terms as well as implicit, socially embedded and legally unenforceable clauses. Additionally, findings show the importance of building up inter-personal and inter-organizational trust to establish feedback channels and increase team familiarity leading to increased performance outcomes. This research illustrates that organizations should manage systemic complexity through multiple governance mechanisms as this study showed the limits of both contractual and relational governance mechanisms when used individually.

The paper has six sections. Following the introduction, section 2 introduces the core notions of complexity and exchange governance. Section 3 discusses the methodological considerations for the multiple case study approach. A description of the case study context and findings are presented in section 4. Sections 5 and 6 discuss the findings in the light of the conceptual background and conclude by formulating implications for managers, policy makers and outlining future research.

2. Conceptual Background

2.1. Complexity and Organizations

Despite the relatively recent interest of management scholars in the study of complex systems (e.g. McKelvey, 1999; Brown and Eisenhardt, 1997), complexity as a sub-field in the social sciences has existed for many decades². From the general (von Bertalanffy, 1968) and open systems models (Kast and Rosenzweig, 1972), that arguably laid the foundations for modern organization theory (Lawrence and Lorsch, 1967; Thompson, 1967), via system dynamics (Forrester, 1961), complex adaptive systems (Holland, 1975), and deterministic chaos theory (May, 1976). Most management authors employ a "structural" view of complexity, taking into consideration the number of *complicated interrelationships and institutional structures* (Pryor, 1995; Stodder, 1995) in an organizing system. Remington and Pollack (2007), for example, emphasize the challenge of dealing with the non-linear, emergent behavior that can occur from interactions between many interconnected tasks. More pragmatically, Williams

² Of course, complexity is a hugely multidisciplinary concept, having been previously explored in a variety of disciplines including mathematics, physics, economics and biology (e.g. Lewin, 1992; Waldrop, 1992).

(2002) suggests that structural complexity creates: (i) multiple objectives with conflicting goals, and (ii) a multiplicity of stakeholders. Similarly, complex product systems (CoPS) research has highlighted how ever greater demands on performance, capacity and reliability result in system complexity increasing across generations (Davies, 2004). In seeking to extract meaningful prescription from complexity theory, many authors have effectively (if rarely explicitly) revisited Ashby's law of requisite variety: "if a system is to be stable, the number of states of its control mechanism must be greater than or equal to the number of states in the system being controlled" (Ashby, 1956). In other words, proponents of complexity theory conclude that organizations should *not try to reduce* complexity, but rather respond via more complex strategies, structures, and decision processes (Boisot and Child, 1999; Eisenhardt et al., 2000).

In the PCP sub-field complexity has typically been defined, using the CoPS logic, as the extent to which infrastructural components of the whole system are 'bespoke or highly customized' (Brady et al., 2005) and service performance is a function of characteristics such as the number of project stakeholders and the length of planning/contracting negotiation and construction phases (Lewis and Roehrich (2009). Interestingly, even for PCP studies the predominant unit of analysis has been complexity at the level of the project, product-service and organization, whereas this study seeks to investigate complexity using an intra- *and* inter-organizational level of analysis. For this application, it is interesting to again revisit Ashby's work because he adopted the relatively unusual approach of not 'building' complexity by assembling components, but rather looking for the constraints that reduce the potential variety to that observed.

2.2 Complexity and Exchange Governance

The extant purchasing and supply management literature offers limited insights into the impact of complexity on exchange governance (Williams, 1999). There has been much debate about the key ingredients of exchange governance with an increasing number of studies investigating, for example, whether contractual and relational governance function as substitutes or complements (e.g. Poppo and Zenger, 2002; Zheng et al., 2008). Likewise, with specific reference to relational governance components of the exchange 'mix', studies have distinguished between various forms of trust, such as intentional and competence trust (e.g. Klein Woolthuis et al., 2005). The following section explains contractual and relational complexity as two important concepts in long-term exchange relationships.

Contractual Complexity

Contractual governance refers to “explicit, formal and usually written contracts” (Vandaele et al., 2007, p.240), representing detailed, binding legal agreements that specify the obligations and roles of both parties in a relationship (Lyons and Mehta, 1997). Contractual safeguards are established to minimize cost and performance losses from relationship hazards (Joskow, 1988). Scholars have argued that more complex relationships (determined by, for instance, asset specificity and contract duration) result in parties aiming to write more complex contracts in order to foresee every possible future contingency (Klein et al., 1978). Similarly, as investments become more specific to the buyer-supplier relationship, Williamson (1983) anticipated that cost-minimizing institutional choice will respond by moving from simple anonymous (spot) market contracting (classical contract law), to more complex long-term contractual arrangements with protective provisions (neoclassical contract law).

Consider the particular example of contracting for public-private partnerships³ (PPPs). Prior studies have observed and argued for more complex contracts (e.g. Leiringer, 2006; Iossa et al., 2007) to govern these classic PCP-type arrangements. Yet, governance through formal contracts depends on the programmability of tasks and behaviors and the measurability of outcomes *ex-ante* (Das and Teng, 2001). Thus, the transaction process and outcome between two contracting organizations needs to be predictable and codifiable (Bijlsma-Frankema and Costa, 2005). Even in relatively simple exchange arrangements it is rarely possible to draft complete contracts (i.e. given the presence of asymmetric information, time and cost constraints, etc.) and, correspondingly, the notion of 'completeness' is particularly problematic in PCP (Bijlsma-Frankema and Costa, 2005) where there is a very large number of technological and transactional variables, all multiplied by the uncertainties introduced by extended timeframes (Lewis and Roehrich, 2009). Equally, formal contracts require monitoring to determine actors' behavior with regards to the rules set out in the contract. Here again, monitoring a complex system may be impractical and/or uneconomic. In sum, although contractual governance complexity (e.g. the number of safeguards and contingencies specified in the contract and the contract length in pages: Joskow, 1988;

³ New public management (NPM) reforms (Dawson and Dargie, 2000; Broadbent and Laughlin, 2005; Vincent-Jones, 2006) – a prevalent theme in public policy throughout the last two decades - aimed to achieve higher efficiency levels, by drawing on expertise and managerial input from the private sector (Hood, 1995).

Egglestone et al., 2000) is often observed in PCP arrangements, it may not deliver meaningful enforcement and control.

Relational Complexity

Relational governance emerges from the values and agreed-upon processes in the exchange relationship (Macneil, 1980) and incorporates: trust and commitment (Lui and Ngo, 2004), relational capital (Kale et al., 2002), information sharing routines (Poppo et al., 2008), and informal exchange (Cook and Emerson, 1978). Unforeseeable relationship contingencies are safeguarded by flexibility, which allows for a bilateral approach to problem solving, solidarity and information sharing. Moreover, partnering organizations' expectations of relationship continuity and longevity that accompany relational governance generate incentives to make exchange-specific investments (Poppo and Zenger, 2002). Trust is considered to be an important element of relational governance, resulting in decreased relational risk (Granovetter, 1973; Dyer and Oh, 1988). Following Poppo and Zenger (2002), relational governance complexity is an emergent function of characteristics such as the extent of trust on an inter-personal and inter-organizational level and the extent of information sharing routines and communication channels. Increasingly dense and extended patterns of reciprocal interdependence and increasingly frequent interactions across all types of pre-established intra- and inter-organizational boundaries (Scharpf 1994) all contribute to increased relational governance complexity. In PCP arrangements, relational governance often begins without previous exchange experience (i.e. they are novel, one-off contracts) and can be harder to maintain as the scale and scope of exchange increases, because repeated business is less likely and, for example in PPP arrangements, there is unlikely to be cultural homogeneity⁴ (North, 1990). In sum, although relational governance complexity may be crucial to effective PCP governance, the creation, maintenance, and enrichment of relational governance (e.g. networks of social ties) will be time and resource consuming (Larson, 1992). Figure 1 illustrates the relationships among the key concepts under investigation.

Please insert Figure 1 'Conceptual framework' about here

3. Research Methodology

⁴ PPP relationships are heavily influenced by: power imbalance (Grimshaw *et al.*, 2002); divergent values and strategies in contractual negotiations/performance management (Teisman and Klijn, 2004); and inappropriate risk and benefit sharing (Dixon *et al.*, 2005; Erridge and Greer, 2002).

The research uses an abductive multiple case study method (Stake, 1995; Dubois and Gadde, 2002) and adopts Van de Ven's (2007) approach for studying processes unfolding over time. To some extent the empirical fieldwork parallels the theoretical conceptualizations in this research study. The abductive approach presents a more accurate picture of the cumulative research process that is interwoven with the development of concepts and empirical findings of this research. The logic of abduction is that the research process commutes between theories and practice as an interweaving dialogue between theory and empirical findings. The process-based case study approach aims to identify explanations of complex phenomena that have evolved over time and which have received limited prior investigation (Yin, 2003; Suddaby, 2006). These phenomena are investigated in their natural context, generating rich datasets which are particularly important for the measurement of complex and intangible phenomena. Two UK Public Private Partnership projects were investigated across two different sectors: healthcare and waste management. PPPs are types of long-term inter-organizational relationships which bring together public and private organizations for the design, build, operate, and finance elements. A common characteristic of PPP projects is that they are concerned with core public services which are often politically sensitive such as healthcare and education (Grout, 1997).

Overall, 43 semi-structured, face-to-face interviews with different key stakeholders lasting between one to two hours were conducted over a period of three years. Interviews for each case were conducted with, for example, project managers, facilities managers and project directors from the private and public sector organizations forming the dyadic relationship (Appendix A). The research acknowledged the complex network associated with PPP projects, thus data collection moved beyond the dyadic relationship. Additional interviews were conducted with key stakeholders such as sub-contractors and relevant government departments. Interviewees can be categorized into three groups: first, individuals from multiple levels of the organizational hierarchy such as middle managers, directors and ex-CEOs; second, individuals from different functional areas such as operational and strategic management and third, individuals present at different points in the relationship's history in order to extract insights and to understand how the relationship has evolved. At each interview, two researchers were present to take additional notes which were later compared and typed up (Yin, 2003). Interviews were taped and transcribed, whilst the confidentiality of participating organizations and individuals was assured. Interview data reliability was further strengthened through triangulation of data sources including secondary sources such as

company documentation and reports from HM Treasury and the Audit Commission. In order to address construct validity, this study deployed different remedies: using multiple sources of evidence, establishing a chain of events, and having key informants review individual case reports (Yin, 2003; Gibbert et al., 2008). Discrepancies between different informants were addressed by triangulating primary interview data with secondary data sources from company and government reports. In addition, draft case reports were sent to key informants to clarify and address any occurring discrepancies. Table 1 summarizes the different tactics and their operationalization within our study. In conclusion, the different tactics employed within the study were primarily concerned with establishing consistency and visibility throughout the data collection and analysis phases. Consequently, the application of different tactics ensured valid and reliable conclusions, thus strengthening the research credibility of our work.

Please insert Table 1 ‘Summary of research credibility’ about here

Case analysis

The software package NVivo was used to support the analysis of interview transcripts. Both authors were involved in the extensive coding and data analysis processes. Specific coding included contextual variables and the level of significance attached to the use of relational and contractual governance. Measuring contractual governance complexity was based on indications of documentary changes or explicit referral events, (e.g. third party legal support). Measurements for concepts such as performance were triangulated using primary interview data and secondary data such as company and government reports. Overall performance was measured by taking into consideration the following dimensions: (i) interviewees’ perception of performance outcomes measured on a 5-point Likert scale; (ii) primary and secondary data regarding the design phase and construction phase completion on time; (iii) primary and secondary data on design phase and construction phase completion on budget; and (iv) primary and secondary data on design phase and construction phase completion and operations phase service delivery to quality standards as set out in the contract. A wealth of secondary data is publically available because of the nature of public-private relationships delivering PCP arrangements which are constantly under public scrutiny.

Case Selection

Embarking on an empirical study designed to answer the research question required us to make ex-ante judgments of systemic and governance complexity; in effect adopting a

probabilistic view of complexity. Systemic complexity offers a more encompassing measurement and reflects a combination of previous complexity measurements (adopted from system complexity - Simon, 1962; Hobday, 2000). Systemic complexity was assessed as a function of (a) the number of project stakeholders, (b) the length of planning/contracting negotiation and construction phases, and (c) the degree of substantially bespoke or highly customized hardware and software elements. Our case selection was informed by considerations that Public Private Partnerships are archetypes PCP-type arrangements, considering the myriad of stakeholders, the extended periods of contract negotiation, design and construction of public sector infrastructure and services, and the high degree of highly customized elements (e.g. Caldwell et al., 2009; Caldwell and Howard, 2010).

The positioning is relative to each other and not absolute. That means, while the healthcare project has been positioned as more complex than the waste management case, the healthcare case would be seen as less complex when compared to, for instance, airborne surveillance and counter-measure aircraft Nimrod/MRA4 or Heathrow Terminal 5. There were also differences in terms of project performance outcomes. Figure 2 summarizes the differences across both investigated cases. Governance complexity was measured in two parts. We followed previous work in using the length of the contract (in pages) and its number of contingencies as an indicator of contractual complexity (Joskow, 1988; Poppo and Zenger, 2002). Finally, relational complexity was measured, following the study by Zaheer et al. (1998), via a proxy measure rating the significance of inter-personal and inter-organizational relationships as indicated by buyer and supplier interviewees.

*Please insert Figure 2 ‘Systemic complexity and performance outcomes across cases’
about here*

4. Case findings

This section reports on the case findings of two investigated cases across different sectors. Table 2 summarizes the key case characteristics.

Please insert Table 2 ‘Overview of key case features ’ about here

4.1 Hospital Case

Systemic complexity

Faced with the requirement to centralize and modernize healthcare services, an 18th century infirmary in the town center had closed, and the majority of services were moved to a new hospital site. The PPP project led to the construction of a new £150M hospital providing accommodation for neuroscience, general and plastic surgery and adult services. An adjacent building accommodated the children's hospital and a pediatric assessment clinic. The hospital also included coffee bars, various shops and a pharmacy. The hospital was deliberately designed to accommodate future healthcare options (e.g. interchangeable facilities, space for expansion, etc.). The principal exchange governance mechanism was a long-term contract between a single English National Health Service (NHS) Trust and a private partner, a company that combined both construction and facilities management (FM) divisions. The successful supplier was one of only a few companies in the PPP market with experience of designing, building, financing and operating hospitals. The NHS Trust had limited understanding and experience of PPP procurement processes.

Contractual Complexity

The systemic complexity of the project had a direct impact on contractual governance. From the outset of the negotiations for the project, the strategy of both parties “[...] *to deliver an innovative solution for this project*” (Project Director, public partner) led to numerous bespoke and customized hardware (e.g. building) and software (e.g. service) elements. For example, new cleaning technology was specified: “*We put in ride-on dryers. All these long corridors we have got, to get those things you sit on that clean and polish, that takes one guy two hours rather than five guys on a night shift*” (former Facilities Management Director, NHS Trust). Similarly, the contractor's Program Director had responsibility for both the construction and operation phases and, as result, by incorporating 'through-life' design considerations from the outset, complex specifications were developed that sought to include all the factors that might need to be considered during the 20+ years operation phase (e.g. impact of room layouts and flooring material on cleaning services). Contractual consideration was given to how the treatment center (which initially consisted of six bed wards and an administrative area) could be converted into another 36-bed ward. As a result, both organizations spent considerable amounts of time negotiating and writing extensive contracts.

The contract was perceived as playing a central role in governing the complex, long-term supply arrangement, in minimizing risks and consequently achieving desired project outcomes. *“There were so many contract specifications and clauses which we needed to negotiate during early project phases”* (FM Director, private partner). Thus, an extensive bespoke and complex contract was drafted. The contract addresses a high number of possible future contingencies and legal safeguards covering areas such as reporting and information sharing, performance measures, payment mechanisms and dispute resolution and termination procedures. The contracting process also continued throughout the period of the study (i.e. well into the operations phase). For instance, changing requirements regarding the need for portering and cleaning services led to contract (re)negotiations. *“We have recently been through a process of trying to renegotiate the performance management system for portering because it was really far too onerous in the original contract. [...] When the contract was closed there was an assumption that there would be 4,000 portering jobs a month. In the operational phase we exceeded this threshold, having around 25,000 jobs a month, so what we have at the moment is that the thresholds are not aligned to the number of jobs.”* (Hospital General Manager). The private partner’s FM Director stated: *“We found out that the porters were particularly busy and we did not fully understand why and we monitored the activities. The reason is that they are doing work to meet new Trust policies that we have not been informed of [...] Instead of using a nurse to accompany a patient to tests; the nurses used two porters [...]. Unfortunately, the contract did not say anything about how we should handle this situation. We need to go back and rework the contract again [...].”* This problem was typical of the various problems encountered when implementing and operationalizing the bespoke contract in the day-to-day operations.

Relational Complexity

Having gone through a lengthy bidding and contract negotiation phase, both parties encouraged the establishment of inter-personal relationships during the build phase by co-locating their respective project teams. The NHS Trust’s Project Director described the advantages of having co-located offices: *“We had offices alongside each other in the same building. We had a couple of rooms at the end of their building and that meant that when there was a problem, we quite often could simply walk down a corridor and speak to someone and sort it out before it became something else.”* Subsequent contract renegotiations at the end of the build phase were typified by an increased information flow across the partnering organizations because of previously built up inter-personal relationships. During

the transition from the construction to the operate phase, a new project team from the private partner took over. This effectively undermined previously established inter-personal relationships. Subsequent operational problems at the outset of the operations phase were then managed with a predominant emphasis on contractual governance. For example there were lengthy discussions in which both parties resorted to the contract to resolve relationship problems. *“We [the Trust] do not really understand why [the private partner] is not performing according to the contract [...] there has been no information passed on to us [the Trust] [...] and nobody from them [the private partner] came to us [the Trust] to resolve the portering problems [...]. We now need to open up the contract again and have long contractual discussions”* (Trust Project Manager).

4.2 Waste Management Case

Systemic Complexity

A UK Local Government organization was faced with a deteriorating solid waste management situation, a rapidly diminishing landfill capacity and the prospect of strengthened environmental legislation and increase in the cost of landfill in the 1990s. The council is responsible for both collecting household rubbish from all homes in its area and for disposing of the waste that it has collected. The waste management and other cleaning services consist of three principal elements: (i) refuse collection, including collection of grey and green bins from households, bulky and garden waste collection, and trade refuse collection; (ii) integrated waste disposal, comprising various plants, waste transfer stations and recycling centers, and (iii) other cleaning services, consist of, for instance: sweeping roads and footways, emptying litter bins and market cleansing. The council manages 250,000+ tons of waste for disposal annually, of which 75% is household rubbish. New government recycling targets and an absence of long-term landfill capacity in that area triggered the need for a PPP arrangement. The private partner firm constructed various waste facilities such as a waste-to-energy plant, a multi-materials recycling center and a new transfer loading station. The contract covered the management for disposal of all municipal solid waste in the Council area, including the management of waste facilities throughout the county. The buying organization had limited experience of PPP procurement processes. The waste management case exhibited fewer bespoke and customized design elements. However, the lack of relevant experience and appropriate data to design service delivery still resulted in long contract negotiation and design phases. The council's Project Manager explained that

“[...] it was all about the output specification [...] getting it right and considering all the constraints [...] we spent a lot of time with legal people in the room [...].”

Contractual Complexity

From the outset, the contract was perceived by both organizations as playing a central role in minimizing risks and consequently achieving desired project outcomes. Thus, a complex contract was drafted to govern the long-term relationship. The contract covered a variety of possible future contingencies and included legal safeguards in areas related to performance measures, payment mechanisms and dispute resolution and termination procedures. Despite the time spent negotiating and drafting a ‘complete’ contract, interviewees from both organizations later reported that during subsequent project phases the contract appeared to be incomplete, leading to a great many post-contractual variations. For instance, the council’s Project Manager described the on-going contract renegotiations that were necessary during the operation phase. *“There were some problems during the construction phase. These were problems that occurred because we did not get the right information and data to write the output specification at the outset of the project. Now, of course, the project slowed down and we had to revise the contract to reflect relationship changes and so on. That is a very time consuming process and I wonder why we spent so much time upfront negotiating the contract.”* Conversely, there were also problems when attempting to use the bespoke contract in day-to-day operations. The council’s Finance Manager suggested that *“[...] the contract alone included 150 pages of waste term definitions. When should I ever find time to read these? [...] the contract is highly impracticable to use [...].”* Indeed operating such extensive contracts led to frustration as expressed by the council’s former Contract Manager. *“The contract included 44 schedules across 450+ pages [...] including 150 pages of definitions alone. It does not make any sense trying to monitor performance based on that contract”.* To counteract these ‘in practice’ problems, the private partner’s Project Manager explained that both parties set up a working agreement, simplifying contractual terms of day-to-day operations instead of following the complex and detailed contract. *“Whenever something changed, both organizations did not necessarily want to involve their lawyers. This would waste a lot of time and resources. [...] we jointly decided to write a working agreement which contains the most important terms and which is very helpful on a day-to-day basis [...].”* (Project Manager, public partner).

Relational Complexity

While contractual governance mechanisms prescribed formal meetings, informal meetings such as after-work activities or away-days were frequently deployed in early project phases. The development of an early trusting relationship was based primarily on inter-personal relationships between boundary spanners from both organizations. The Project Manager described how “[...] *there were a lot of formal meetings. Every week we had a number of meetings to discuss the contract and performance measures. To counteract this, we organized some informal meetings, for example, going to the pub for a drink after work and getting to know each other better and in a more social setting.*” Prior to signing the contract, both organizations worked together to find two appropriate sites for the recycling center and a new incinerator, thereby clearly signaling a commitment to making the project a success. “*Our partner spent a lot of time with us trying to find appropriate sites for this project. This really showed us that they were serious about our project and we developed some very strong personal relationships with them*” (Contract Manager, public partner). Although this phase was characterized by relational governance mechanisms such as trust and information sharing, the outcome of the negotiating phase was a very detailed contract. Interviewees in this case stressed the point that their successful experience in the earlier project phases made them confident that they could jointly achieve a successful project.

Building up such inter-personal relationships was consistently described as a slow, time-consuming process that needs commitment and consistency across team members. The erosion of inter-personal relationships occurs quickly once a team member left and the boundary-spanning relationship was not maintained by new or existing team members. “*The private partner’s personnel kept changing quite often and it is very difficult to build up any personal relationships with them. [...] So it is a constant process of building relationships over and over again*” (Project Manager, Public Partner).

5. Discussion

5.1. Complex Systems and Complex Contracts?

In both PCP cases, when faced with systemic complexity, the interacting organizations placed high emphasis on the formation of complex contracts, including, for instance, numerous clauses to penalize non-compliance with stipulated terms. Indeed it can be argued that contracts were seen as the *key* mechanism for protecting the relationship against opportunistic behavior by the partnering organization. Moreover, this emphasis continued throughout the

observed timeframe, with regular contract variations arranged to reflect changes and customization of service delivery processes over time. Both projects were underpinned by regular, contractually stipulated contract redrafting and renegotiation periods throughout the project. This finding confirms prior studies, arguing that organizations aim for a high degree of contractual precision and clarity in the agreements.

In these cases, in line with Ashby's law, this intent resulted in contracts comprising thousands of pages and a multitude of schedules and procedures. Across both cases, partnering organizations invested many months in customizing standard contracts to include additional safeguards regulating, for instance, warranties and liabilities, employment and TUPE (Transfer of Undertaking Protection of Employment) regulations and information and audit access. Considering the highly bespoke and customized hard- and software elements in both PCP arrangements, organizations invested a substantial amount of time and resources to draft complex contracts covering thousands of pages to specify possible future contingencies and legal safeguards. At the same time legal agreements were never complex enough. There were always circumstances where they lacked appropriate specifications, providing limited specifications and guidance in the event of operational problems, for example. Despite the extended contract negotiation processes involved in every case, the large number of subsequent contract variations suggests that no matter how many resources contracting parties invest in the drafting process, any contract in such a complex exchange remains, *by definition*, incomplete.

The analysis also illustrated the significant difficulties associated with actually employing a complex contract comprised of hundreds of schedules and procedures. To counteract the problems of complex contracts a shortened working agreement for use in day-to-day operations was produced in the Waste Management case. This working agreement contained extracts of contract clauses, procedures and guidelines that proved helpful on a day-to-day basis in the better performing case. Complex, formal contracts in this case were only deployed to resolve relationship issues exceeding the realm of the working agreement or when extensive relationship changes needed to be reflected in the formal, legally binding complex contract.

5.2 Complex Contracts and Complex Relationships?

The explicit contribution of complex contracts to relational governance was limited to rigid frameworks for formal meetings among senior personnel or for formal information sharing across the various stakeholders. Indeed the findings revealed very limited evidence of organizationally sanctioned socialization mechanisms, such as joint workshops. More negatively, in these PPP examples, exogenous uncertainties such as European and UK procurement laws, which include extensive regulatory frameworks, were perceived to leave little scope to apply a more relational contracting approach based on: common goals, agreed risk-sharing, and open communication. This suggests, in contrast with contractual complexity constructed between exchange partners, externally imposed (e.g. regulatory) frameworks, as found in both investigated cases, can serve to hinder the development of inter-organizational trust.

So what is the purpose of the complex contract and what explains its (apparently ineffectual) persistence? In contrast to the assertion that incomplete contracts may lead to relationship ambiguity (Goldberg, 1976), these exploratory findings may suggest that attempting to resolve contractual incompleteness actually provided the basis for fostering inter-organizational relationships (e.g. facilitating bilateral approaches to problem solving). In the waste management case, complex contracts were considered as a commitment to the long-term relationship and a “safety net”, rather than a practical systemic governance mechanism. In other words, perhaps the contract provided an ongoing formal mechanism for both parties to observe and test each other’s goodwill over time, sequentially and gradually. This appears to echo Ring and Van de Ven’s (1994) findings that the development of trust is a cyclical process of recurrent bargaining, commitment, and execution of events among both partners. Returning to Ashby’s terms, the findings could suggest that it was actually the growing complexity of relational governance (e.g. in the form of boundary-spanning individuals, working agreements) that provided the requisite number of control states.

5.3 Complex Systems and Complex Relationships?

Although these observations clearly reinforce the notion that contractual and relational exchange governance act in combination (cf. Zheng et al., 2008) and, moreover, it can be argued that the development of relationships in complex supply arrangements is substantially influenced by the *process* of complex contractual governance, there were clearly distinct aspects of the evolving complexity of relational governance.

Establishing inter-personal relationships across partnering organizations to overcome difficulties in the early more vulnerable project phases yielded positive relationship effects as evident in the early waste management case. However, given the systemic complexity of PCP arrangements, limited evidence of inter-personal trust was detected in the hospital case. Partnering organizations in this case experienced negative effects from the long-term contract negotiation process, which resulted in distrusting behavior among the contracting parties. The relationship in this case was typified by an aggressive contract approach and mutual blaming behavior. In contrast, when boundary-spanning individuals develop strong inter-personal relationships, this promotes norms of: flexibility, solidarity and reciprocity.

Empirical evidence shows that building up inter-personal relationships at the outset of the project led to higher levels of flexibility in contract interpretation during later project stages. In such situations, contractual governance mainly functions as a ‘framing device’ to resolve operational problems, the use of relational governance can add the necessary flexibility to resolve operational problems. The formation of boundary-spanning relationships is also linked to opportunities for demonstrating and judging trustworthiness. Boundary-spanning individuals were able to immerse themselves in the partnering organization’s culture and environment, thus leading to a better understanding of the counterpart’s objectives and goals.

Findings also suggest that inter-personal trust based on the relationship of boundary-spanning individuals can easily erode once an individual leaves the project. In such circumstances, rebuilding these forms of relationships is a gradual process that takes time. In contrast, inter-organizational trust diminishes gradually step by step as it does not, in comparison to inter-personal trust, rely on individuals, but rather on teams and established organizational frameworks. To maintain inter-personal relationships among contracting parties’ personnel, inter-personal trust that develops should be translated into inter-organizational trust by establishing organizational procedures, such as team meetings and information exchange.

6. Conclusions and Implications

This empirical study provides additional contributions to theoretical and pragmatic understanding of this increasingly significant phenomenon of PCP by investigating the notion of complexity in greater depth, with a specific focus on the relationship between systemic and exchange governance complexity. More specifically, the work explored Ashby’s (1956) assertion that if a system was to be stable, the number of states of its control mechanism must

be greater than or equal to the number of states in the system being controlled. Before outlining the key conclusions from the work, it is important to reflect on some of its limitations. This was an exploratory study and although established literature was used to frame the investigations, there was no formal hypothesis development or testing. This empirical setting of Public Private Partnership projects offered the opportunity to investigate exchange governance over an extended time period in complex supply arrangements. The results should also be considered within the context of the sectors and the country analyzed, and thus their inherent degrees of complexity. Whilst there is no apparent reason why the relationship between systemic complexity and exchange governance complexity in the analyzed relationships would not hold outside of the investigated sectors, further studies could examine other sectors such as transport and education. In addition, other types of PCP-type arrangements should be investigated to further extend our findings beyond the Public Private Partnership domain.

Three main conclusions can be identified. First, the challenge for organizations is to manage inherent complexity in PCP arrangements through contractual and relational exchange governance over time. Findings show that rigid, rule bound and complex contractual exchange governance alone is incapable of adaptation to meet systemic complexity, but provides organizations with a sense of control through a high number of legal safeguards and contingencies. Investing vast amount of resources upfront to write ‘complete’ contracts proved counterproductive as contract revisions are a natural element throughout long-term PCP supply arrangements. As organizations establish complex contractual exchange governance, they often depersonalize the social elements and practices that are vital in PCP arrangements and create instead a rule based system. Building up inter-personal relationships during early relationship stages proved useful throughout later stages. Second, the cases show that inter-personal relationships are crucial to establish feedback channels and increase team familiarity leading to increased performance outcomes. Given the high staff turnover, inter-personal trust needs to be translated into inter-organizational frameworks to promote the formation of inter-organizational routines and channels for information sharing over time. Third, while the majority of organizations in PCP arrangements respond to systemic complexity with ever increasing contractual governance complexity, organizations in the better performing case illustrate that an increase in relational exchange governance should complement contractual exchange governance in PCP arrangements. For instance, findings show that inter-personal relationships facilitated the formation of working agreements. Rather

than counteracting systemic complexity merely with increased contractual complexity, the better performing case also deployed a combination of working agreements and interpersonal relationships. Thus, contractual and relational exchange governance mechanisms act as the PCP variety reducing constraints. This study showed the limits of both contractual and relational governance mechanisms when used individually, hence organizations should manage systemic complexity through multiple governance mechanisms which evolve over time.

Managerial and policy implications

The study's results have several implications in terms of organizations and governments charged with procuring and managing complex performance arrangements. Findings show that organizations in PCP arrangements respond to systemic complexity by increasing exchange governance complexity, leading to complex and unmanageable contracts. To complement complex contracts, relational exchange governance, in forms of inter-organizational and inter-personal relationships, should be deployed to achieve better relationship performance. Contracting capabilities should be combined with relational governance activities, facilitating the formation of inter-personal trust through boundary-spanning relationships. These may lead to increased information sharing and joint problem solving. However, the level of positive performance implications generated from developing inter-personal trust depends also on translating these relationships into inter-organizational frameworks. Public-private relationships, spanning 30 years or more, are increasingly playing a central role in delivering PCP-type arrangements. Governments entering into PCP arrangements need to consider the importance of relational governance in combination with contractual governance to balance risk sharing and to achieve high performance. The study shows that counteracting complexity with ever increasing degrees of contractual governance complexity does not necessarily lead to better performance and may even prove to be counterproductive as resources should rather focus on building up trusting relationships. Rather than seeking to contractually stipulate every possible future contingency, early relationship stages should be focused on building up inter-personal and inter-organizational trust as evidenced in the better performing case. Fostering a higher degree of interaction amongst partnering organizations in PCP arrangements is vital to realize long-term benefits.

References

- Anderson, P. (1999), "Applications of complexity theory to organizational science", *Organization Science*, Vol. 10 No. 3, pp. 216-232.
- Ashby, W.R. (1956), *An Introduction to Cybernetics*, Chapman & Hall.
- Bijlsma-Frankema, K. and Costa, A.C. (2005), "Understanding the trust-control nexus", *International Sociology*, Vol. 20 No. 3, pp.259–282.
- Boisot, M. and Child, J. (1999), "Organizations as adaptive systems in complex environments: the case of China", *Organization Science*, Vol. 10 No. 3, pp. 237-252.
- Brady, T., Davies, A. and Gann, D.M. (2005), "Creating value by delivering integrated solutions", *International Journal of Project Management*, Vol. 23 No. 5, pp. 360–365.
- Broadbent, J. and Laughlin, R. (2005), "The role of PFI in the UK government's modernisation agenda", *Financial Accountability & Management*, Vol. 21 No. 1, pp.75-97.
- Brown, S. L. and Eisenhardt, K. M. (1997), "The art of continuous change: linking complexity theory and time-paced evolution in relentlessly shifting organizations", *Administrative Science Quarterly*, Vol. 42, pp. 1–34.
- Caldwell, N.D.; Roehrich, J.K. and Davies, A.C. (2009). Procuring complex performance in construction: London Heathrow Terminal 5 and a Private Finance Initiative hospital. *Journal of Purchasing & Supply Management*, Vol. 15, pp. 178–186.
- Caldwell, N.D. and Howard, M.B. (2010), *Procuring Complex Performance: Studies of Innovation in Product Service Management*, Routledge/Taylor & Francis, New York, NY.
- Cook, K.S. and Emerson, R.M. (1978), "Power, equity and commitment in exchange networks", *American Sociological Review*, Vol. 43 No. 5, pp. 721-405.
- Cunha, M.P. and Rego, A. (2010). Complexity, simplicity, simplicity. *European Management Journal*, Vol. 28 No. 2, pp. 85-94.
- Das, T.K. and Teng, B.-S. (2001), "Trust, control, and risk in strategic alliances: an integrated framework", *Organization Studies*, Vol. 22 No. 2, pp. 251-283.
- Davies, A. (2004), "Moving base into high-value integrated solutions: a value stream approach", *Industrial and Corporate Change*, Vol. 13 No. 5, pp. 727-756.
- Dawson, S. and Dargie, C. (2000), "New public management: An assessment and evaluation with special reference to UK health", *Public Management*, Vol. 1 No. 4, pp.459-481.
- Dixon, T.; Pottinger, G. and Jordan, A. (2005), "Lessons from the private finance initiative in the UK: benefits, problems and critical success factors", *Journal of Property Investment and Finance*, Vol. 23 No. 5, pp. 412 - 423.
- Dubois, A. and Gadde, L.E. (2002), "Systematic combining: an abductive approach to case research", *Journal of Business Research*, Vol. 55 No. 7, pp. 553-560.
- Dyer, J.H. and Oh, S. (1988), "A transaction cost perspective on vertical contractual structure and interchannel competitive strategies", *Journal of Marketing*, Vol. 52 No. 2, pp. 21-34.
- Eggleston, K., Posner, E.A. and Zeckhauser, R. (2000), "Simplicity and complexity in contracts", *John M. Olin Law & Economics working paper no. 93 (2nd series)*, The Law School, The University of Chicago, 18th January 2000, pp.1-46.
- Eisenhardt, K.M., Brown, S. and Neck, H.M. (2000), "Competing on the entrepreneurial edge", in Meyer, G.D. and Heppard, K. (eds.), *Entrepreneurial strategies*. Thousand Oaks, CA: Sage Publications, pp. 49-62.
- Erridge, A. and Greer, J. (2002), "Partnerships and public procurement: building social capital through supply relations", *Public Administration*, Vol. 80 No. 3, pp. 503–522.
- Forrester, J.W. (1961), *Industrial Dynamics*, Waltham, MA: Pegasus Communications.
- Geraldi, J., Maylor, H. and Williams, T. (2011), "Now, let's make it really complex (complicated) A systematic review of the complexities of projects", *International Journal of Operations and Production Management*, Vol. 31 No. 9, pp. 966-990.

- Gibbert, M., Ruigrok, W. and Wicki, B. (2008), "What passes as a rigorous case study?", *Strategic Management Journal*, Vol. 29, pp. 1465-1474.
- Goldberg, V.P. (1976), "Towards an expanded theory of contract", *Journal of Economic Issues*, Vol. 10 No. 1, pp. 45-61.
- Granovetter, M.S. (1973), "The strength of weak ties", *American Journal of Sociology*, Vol. 78 No. 6, pp. 1360-1380.
- Grimshaw, D.; Vincent, S. and Willmott, H. (2002), "Going privately: partnership and outsourcing in UK public services", *Public Administration*, Vol. 80 No. 3, pp. 475-502.
- Grout, P.A. (1997), "The economics of the private finance initiative", *Oxford Review of Economic Policy*, Vol. 13 No. 4, pp. 53-66.
- Hobday, M. (2000), "The project-based organization: an ideal form for managing complex products and systems?", *Research Policy*, Vol. 29, pp. 871-893.
- Holland, J.H. (1975), *Adaptation in Natural and Artificial Systems*, Ann Arbor: University of Michigan Press.
- Hood, C. (1995), "The new public management in the 1980s: Variations on a theme", *Accounting, Organizations and Society*, Vol. 20 No. 2/3, pp.93-109.
- Iossa, E., Spagnolo, G. and Vellez, M. (2007), *Contract Design in Public-Private Partnerships*, Report prepared for the World Bank, September 2007.
- Joskow, P. (1988), "Asset specificity and the structure of vertical relationships: empirical evidence", *Journal of Law, Economics, and Organization*, Vol. 4 No. 1, pp. 95-118.
- Kale, P., Dyer, J. and Singh, H. (2002), "Alliance capability, stock market response, and long-term alliance success: the role of the alliance function", *Strategic Management Journal*, Vol. 23 No. 8, pp. 747-767.
- Kast, F.E. and Rosenzweig, J.E. (1972), "General systems theory: applications for organization and management", *Academy of Management Journal*, Vol. 15, pp. 447-465.
- Klein, B., Crawford, R.A. and Alchian, A.A. (1978), "Vertical Integration, appropriable rents, and the competitive contracting process", *Journal of Law and Economics*, Vol. 21, pp. 297-326.
- Klein Woolthuis, R.K, Hillebrand, B. and Nooteboom, B. (2005), "Trust, contract and relationship development", *Organization Studies*, Vol. 26 No. 6, pp.813-840.
- Larson, A. (1992), "Network dyads in entrepreneurial settings: a study of the governance of exchange relationships", *Administrative Science Quarterly*, Vol. 37 No. 1, pp. 76-104.
- Lawrence, P. and Lorsch, J. (1967), *Organization and Environment*, Cambridge, MA: Harvard University Press.
- Leiringer, R. (2006), "Technological innovation in PPPs: incentives, opportunities and actions", *Construction Management and Economics*, Vol. 24, pp. 301-308.
- Levinthal, D. and Warglien, M. (1999), "Landscape design: designing for local action in complex worlds", *Organization Science*, Vol. 10 No.3, pp. 342-357.
- Lewin, R. (1992), *Complexity: Life on the Edge of Chaos*, New York: Macmillan.
- Lewis, M.A. and Roehrich, J. (2009), "Contracts, relationships and integration: towards a model of the procurement of complex performance", *International Journal of Procurement Management*, Vol. 2 No. 2, pp. 125-142.
- Lui, S.S. and Ngo, H.-Y. (2004), "The role of trust and contractual safeguards on cooperation in non-equity alliances", *Journal of Management*, Vol. 30 No. 4, pp. 471-485.
- Lyons, B. and Mehta, J. (1997), "Contracts, opportunism and trust: self-interest and social orientation", *Cambridge Journal of Economics*, Vol. 21 No. 2, pp. 239-257.
- Macneil, I.R. (1980), *The New Social Contract: An Inquiry into Modern Contractual Relations*, London: Yale University Press.
- Mahony, J.T., McGahan, A.M. and Pitelis, C.N. (2009), "The interdependence of private and public interests", *Organization Science*, Vol. 20 No. 6, pp. 1034-1052.

- McKelvey, B. (1999), "Complexity theory in organization science: seizing the promise or becoming a fad?", *Emergence*, Vol. 1 No. 1, pp. 5–32.
- North, D.C. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge: University Press.
- Poppo, L. and Zenger, T. (2002), "Do formal contracts and relational governance function as substitutes or complements?", *Strategic Management Journal*, Vol. 23 No. 8, pp. 707-725.
- Poppo, L.; Zhou, K.Z. and Zenger, T.R. (2008), "Examining the conditional limits of relational governance: specialized assets, performance ambiguity, and long-standing ties", *Journal of Management Studies*, Vol. 45 No. 7, pp. 1195-1216.
- Pryor, F.L. (1995), *Economic Evolution and Structure: The Impact of Complexity on the U.S. Economic System*, New York: Cambridge University Press.
- Remington, K. and Pollack, J. (2007), *Tools for Complex Projects*, Aldershot, UK, Gower Publishing.
- Ring, P.S. and Van de Ven, A.H. (1994), "Developmental processes of cooperative interorganizational relationships", *Academy of Management Review*, Vol. 19 No. 1, pp. 90-118.
- Scharpf, F.W. (1994), "Games real actors could play: positive and negative coordination in embedded negotiations", *Journal of Theoretical Politics*, Vol. 6 No. 1, pp. 27-53.
- Simon, H.A. (1962), "The architecture of complexity", *Proceedings of the American Philosophical Society*, Vol. 106, pp. 467-482.
- Stake, R.E. (1995), *The Art of Case Study Research*, London: Sage.
- Stodder, J.P. (1995), "The evolution of complexity in primitive economies: theory," *Journal of Comparative Economics*, Vol. 20 No.1, pp. 1-31.
- Suddaby, R. (2006), "From the editors: what grounded theory is not", *Academy of Management Journal*, Vol. 49 No. 4, pp. 633-642.
- Teisman, G.R. and Klijn, E.H. (2004), "PPPs: torn between two lovers", *EBF Debate*, Vol. 18, pp. 27-29.
- Thompson, D. (1967), *Organizations in Action*, McGraw-Hill, New York.
- Vandaele, D., Rangarajan, D., Gemmel, P. and Lievens, A. (2007), "How to govern business services exchanges: contractual and relational issues", *International Journal of Management Reviews*, Vol. 9 No. 3, pp. 237-258.
- Van de Ven, A. (2007), *Engaged Scholarship: A Guide for Organizational and Social Research*, Oxford University Press, Oxford.
- Vincent-Jones, P. (2006), *The New Public Contracting*, Oxford, UK: Oxford University Press.
- von Bertalanffy, L. (1968), *Organismic Psychology and Systems Theory*, Worcester: Clark University Press.
- Waldrop, M. (1992), *Complexity: The Emerging Science at the Edge of Order and Chaos*, New York: Simon and Schuster.
- Williams, T.M. (1999), "The need for new paradigms for complex projects", *International Journal of Project Management*, Vol. 17, No. 5, pp. 269-273.
- Williams, T.M. (2002), *Modelling Complex Projects*, London: Wiley.
- Yin, R.K. (2003), *Case Study Research: Design and Methods*, 3rd ed. London: Sage.
- Zaheer, A., McEvily, B. and Perrone, V. (1998), "Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance", *Organization Science*, Vol. 9 No. 2, pp. 141-159.
- Zheng, J., Roehrich, J.K. and Lewis, M.A. (2008), "The dynamics of contractual and relational governance: evidence from long-term public-private procurement arrangements", *Journal of Purchasing & Supply Management*, Vol. 14 No. 1, pp. 43-54.

Figures and tables

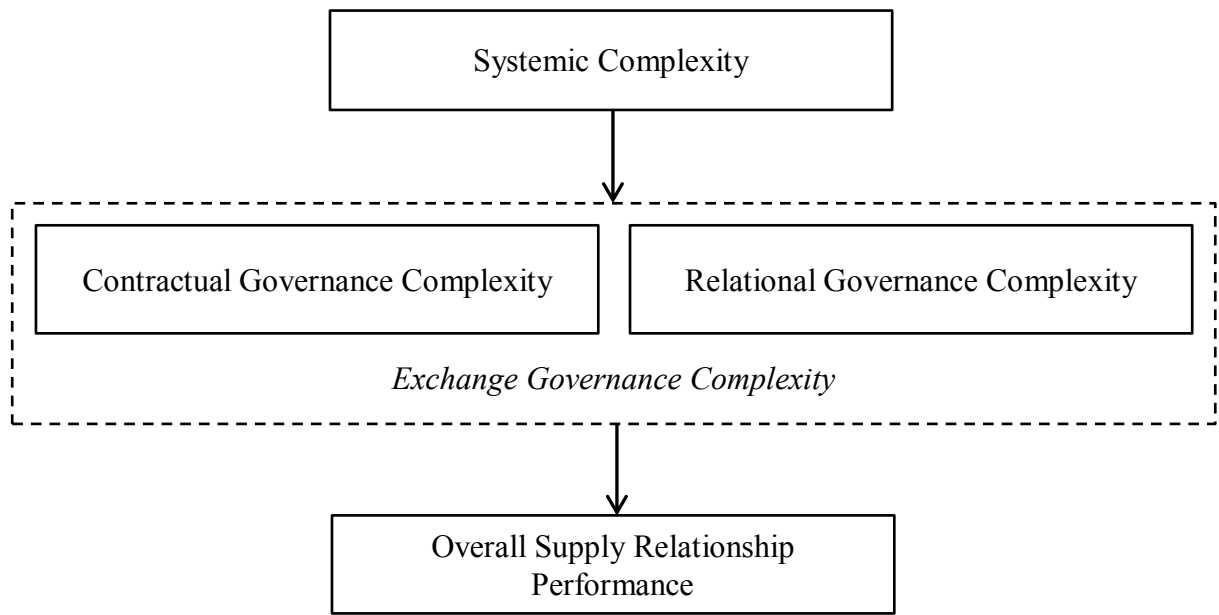


Figure 1 Conceptual framework

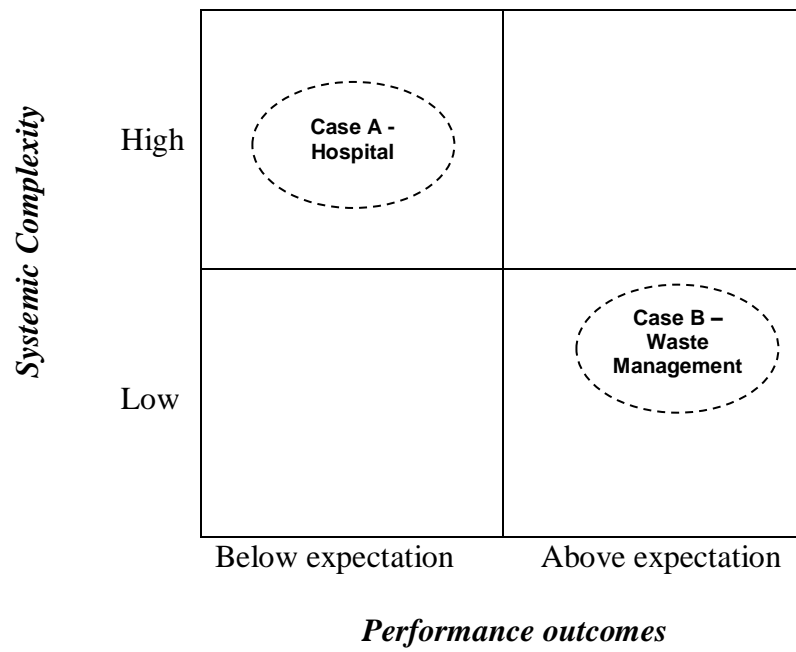


Figure 2 Systemic complexity and performance outcomes across cases

Test	Tactic	Research Phase	Operationalization
<i>Construct Validity</i>	<i>Use multiple sources of evidence</i>	Data collection	Evidence was collected from buyer and supplier side (multiple perspectives; multiple informants) Data triangulation was supported by documentary evidence;
	<i>Establish chain of evidence</i>	Data collection	Original material (interview transcripts and government/company documentary) was referenced Documents and transcripts were collected for verification
	<i>Key informants review draft report</i>	Composition	Case study description was sent to interviewees to verify the analysis
<i>Internal Validity</i>	<i>Pattern-matching</i>	Data analysis	Pattern matching; research questions; theory triangulation
<i>External Validity</i>	<i>Use replication logic in multiple-case studies</i>	Research design	Case studies rely on 'analytical generalization' rather than 'statistical generalization' Case studies aim to generalize to some wider theory, rather than a population
<i>Reliability</i>	<i>Interview guide</i>	Data collection	Guide contained the procedures and questions for the data collection phase
	<i>Case study database</i>	Data collection	Created a case study database during data collection including interview transcripts, observation notes and government/company documentary

Table 1 Summary of research credibility

(adapted from Yin, 2003; Gibbert et al., 2008)

	Case A – Hospital	Case B – Waste Management
<i>Performance Bundle</i>	Design Build Finance and Operate (DBFO) contract; construction of new hospital; hard (estate) and soft service FM	Design Build Finance and Operate (DBFO) contract; construction of new waste treatment plants and stations; no waste collection
<i>OJEU advert</i>	Early 2002	Early 1997
<i>Financial close</i>	Late 2003	Early 1998
<i>Operate since</i>	Late 2006	Early 1998 (parallel build and operate phase)
<i>Contract nature and value</i>	Standard contract (version 3); approx. £150m	Non-standard contract; approx. £35m
<i>Contract duration</i>	30 years	25 years
<i>Performance complexity</i> (average of interviewees' perception; 5-point Likert scale)	3.1 Late completion of design and construction phase; below quality standards on operations phase	4.5 On time completion of design phase; above quality standards during operations phase
<i>Systemic complexity</i>	Myriad of project stakeholders; prolonged planning and contract negotiation phase; late completion of construction phase; numerous bespoke and highly customized hardware and software elements	Myriad of project stakeholders; long planning and contract negotiation phase; on time completion of construction phase (parallel to operations phase); some degree of bespoke and highly customized hardware and software elements

Table 2 Overview of key case features

Appendix A: Record of Fieldwork

	Position	Organization
	Case A – Hospital	
1	General Manager	Private partner
2	Director of Business Development	Private partner
3	Manager - build phase	Private partner
4	Technical Advisor	NHS Trust
5	Consultant	Private Finance Unit (PFU)
6	Board of Directors	Private partner
7	Project Director	Private partner
8	Project Manager	Private partner
9	Program Director	Private partner
10	Commercial Manager	Private partner
11	Commercial Director	Private partner
12	General Manager	Private partner
13	Board Director (SPV)	Bank
14	Project Director	NHS Trust
15	Consultant	Private Finance Unit (PFU)
16	Manager	Bank
17	FM Director	Private partner
18	Project Manager	NHS Trust
19	Project Manager	NHS Trust
20	Manager	DoH
	Case B - Waste Management	
21	Policy Advisor - Waste Implementation Program	DEFRA
22	Contract Manager	Council
23	Contract Manager	Council
24	Project Manager	Council
25	<i>early</i> Project Manager	Private partner
26	<i>current</i> Contract Manager	Private partner
27	<i>first</i> Managing Director	Private partner
28	Project Manager	Council
29	Assistant Service Manager	Council
30	Waste Project Team Assistant	Council

31	Contract Manager	Council
32	Assistant Contract Manager	Council
33	Group Finance Manager	Council
34	<i>current</i> Contract Manager	Private partner
35	Contract Manager	Council
36	Project Manager	Council
37	Finance Manager	Council
38	Project Manager	Private Partner
39	<i>current</i> Contract Manager	Private partner
40	Finance Manager	Council
41	Contract Manager	Council
42	Manager	DEFRA
43	Project Manager	Private partner

Brief bios:

Dr Jens Roehrich is a Lecturer at the School of Management, University of Bath, UK. Before joining the University of Bath, Jens was a Researcher at Imperial College Business School, Imperial College London, UK. His research activities are centered around questions of how public and private organizations are increasingly procuring complex performance (PCP). Particularly, his research focuses on the management of long-term inter-organizational relationships, including the dynamic interplay of contracts and trust. Jens has contributed to several book chapters on PCP-related themes and his research has been published or is forthcoming in journals such as the International Journal of Operations and Production Management, Industrial Marketing Management and the Journal of Purchasing and Supply Management.

Professor Michael A Lewis is Professor of Operations and Supply Management at the University of Bath School of Management and Head of the Information, Decision and Operations (IDO) group. His current research interests include professional service productivity, complex procurement arrangements and functional strategy practice. His work has been published in journals including Journal of Operations Management, British Journal of Management, Omega and Harvard Business Review. He currently serves as an Associate Editor for the Journal of Operations Management and on the editorial boards of the International Journal of Operations and Production Management and the Journal of Purchasing and Supply Management.